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10/725,397	12/03/2003	Masao Kato	03500.017754.	5019

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EXAMINER	
KAU, STEVEN Y	

ART UNIT	PAPER NUMBER
2625	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/725,397	KATO ET AL.	
	Examiner	Art Unit	
	STEVEN KAU	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 August 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3,7,9,13,15 and 25-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3,7,9,13,15 and 25-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 11, 2009 has been entered.

Status of the Claims

2. Claims 2, 4-6, 8, 10-12, 14, and 16-24 have been canceled and claim 30 has been added as a dependent claim to Claim 1. Claims 1, 3, 7, 9, 13, 15, 25-30 are pending for further examination in this Action.

Response to Remark/Arguments

3. Applicant's arguments with respect to claims 1, 3, 7, 9, 13, 15 and 28 have been fully considered and the reply to the Remarks/Arguments is in the following:

- Applicant's arguments, "Claims 7, 9 and 26 Rejections Under 35 U.S.C. § 101", Page 10, Remark, 8/11/2009, with respect to claims 7, 9 and 26 have been fully considered and are persuasive. In addition, claims 7, 9

and 26 have been amended to satisfy the statutory requirements of 35 U.S.C. § 101. The rejection of claims 7, 9 and 26 under 35 U.S.C. § 101 has been withdrawn from the record.

- Applicant's arguments with respect to Claims 1, 3, 7, 9, 13, 15 and 28 have been fully considered but are not persuasive.

Applicant argues, "The applied art, alone or in any permissible combination, is not seen to disclose or to suggest the first processing unit, the second processing unit, or the error diffusion control unit as claimed, and in particular, is not seen to disclose or to suggest at least the features of a first processing unit that executes the error diffusion process by changing at least one of a quantization threshold value and a quantization diffusion coefficient which are used for the error diffusion process on the basis of information on one of the density components to be processed, a second processing unit that executes the error diffusion process by setting, into fixed values, the quantization threshold value and the quantization diffusion coefficient which are used for the error diffusion process, wherein the error diffusion process by the second processing unit requires a lighter processing load than the error diffusion process by the first processing unit; and an error diffusion processing control unit that controls to execute, by the first processing unit, the error diffusion process to a first density component among the plurality of density components, and by the second processing unit, the error diffusion process to a second density component among the plurality of density components, wherein the quantization diffusion coefficient is used to diffuse an

error caused by a quantization process which is performed using the quantization threshold value to neighboring pixels", pages 13-14, Remarks, 8/11/2009.

In re, the examiner respectfully disagrees with the above statement. As discussed in the previous Office Action, the structure of the claimed apparatus was taught by Tajika' 374. For instance, Tajika teaches first processing unit (page 6, Action), the second processing unit (page 6, Action) and as well as the error diffusion control unit (page 7, Action). Referring to Figure 1 of embodiment 1, binary circuits 25 and 26 are designated as two different dither processes, or error diffusion processes for dark and light ink of color components, respectively. The examiner would also refers the applicant to Figure 4 of Tajika et al' 374, where teaches a halftoning structure, meaning a control unit (Image Processing Circuit 41) for selecting or controlling dark/light ink data for halftoning processes, two halftoning processing units (Binary Circuit 43 and Binary Circuit 44).

Furthermore, the structure of the claimed image processing apparatus of the pending invention is not new. For instance, Takano et al (US 6,643,031) teach dual error diffusion processing units (see Figure 23) and is controlled by the main processor of Fig. 1.

Therefore, the pending invention is not in the condition for patentability.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1, 3, 7, 9, 13, 15, 28 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tajika et al (US 5,142,374) in view of Nomura (US 5,708,728).

Regarding claim 1.

Tajika discloses an image processing apparatus for executing an error diffusion process to a plurality of density components (**i.e. referring to Fig. 1, an image process system performs error diffusion process to color components, i.e. cyan, magenta, yellow and black, col 4, lines 31-59**), comprising: a processor and a memory (**i.e.**

referring to Fig. 9, an image processing system includes a CPU, or a microprocessor and memory, col 8, lines 18-38);

a first processing unit (**i.e. referring to Fig. 1, a binary circuit 25**) that executes the error diffusion process (**i.e. a dither process for dark ink**) by changing at least one of a quantization threshold value and a quantization diffusion coefficient which are used for the error diffusion process on the basis of information on one of the density components to be processed (**i.e. error diffusion process is performed for multi-drop pixels with a plurality of threshold levels corresponding to different gray values, or density values, col 6, lines 18-36**);

a second processing unit (**i.e. referring to Fig. 1, a binary circuit 26**) that executes the error diffusion process (**i.e. a dither processing for light ink**) wherein the error diffusion process by the second processing unit requires a lighter processing load than the error diffusion process by the first processing unit (**i.e. Tajika discloses two different dithering processes, one for dark density ink and the other for light density ink; for dark density ink, error diffusion process is performed with a plurality of threshold values and thus it requires longer time to complete the process, col 6, lines 18-36**); and

an error diffusion processing control unit (**Masking/UCR Processing 23 of Fig. 1, Image Processing Circuit 41 of Fig. 4, & Image Processing Circuit 71 of Fig. 7**) that controls to execute, by the first processing unit, the error diffusion process to a first density component among the plurality of density components (**i.e. a dither, or error diffusion process is performed for color pixels with a plurality of threshold levels**

corresponding to different density values, col 6, lines 18-36), and by the second processing unit (**i.e. referring to Fig. 1, a binary circuit 26**), the error diffusion process to the a second density component among the plurality of density components wherein the first and second density components have respective different component types and wherein one dot output based on the first density component has a lower density than one dot output based on the second density component (**i.e. Tajika discloses a color density discrimination table separating light and dark inks based on ink density, and different dither processes are performed to light/dark ink in accordingly; thus, one dot of output based on the second process of Tajika has lower density of the dot processed in the second Tajika's dither process, Figs. 1-3, col 4, lines 30-59**).

Tajika does not disclose by setting, into fixed values, the quantization threshold value and the quantization diffusion coefficient which are used for the error diffusion process, and wherein the quantization diffusion coefficient is used to diffuse an error caused by a quantization process which is performed using the quantization threshold value to neighboring pixels.

Nomura teaches by setting, into fixed values, the quantization threshold value and the quantization diffusion coefficient which are used for the error diffusion process (**i.e. a conventional binarization or quantization process that having a predetermined threshold and a matrix of diffusion coefficient as taught in Fig. 1, col 1, line 66 to col 2, line 56; and referring to Figs. 6-8, col 8, line 1 to col 9, line37 for improved error diffusion process**), and wherein the quantization diffusion

coefficient is used to diffuse an error caused by a quantization process which is performed using the quantization threshold value to neighboring pixels (**referring to Steps S7 to S11 of Fig. 1, error is distributed to neighboring pixels, col 2, lines 29-62; and referring to Figs. 6-8, col 8, line 1 to col 9, line37 for improved error diffusion process**).

Having an image processing apparatus of Tajika' 374 reference and then given the well-established teaching of Nomura' 728 reference, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the image processing apparatus of Tajika' 374 reference to include by setting, into fixed values, the quantization threshold value and the quantization diffusion coefficient which are used for the error diffusion process, and wherein the quantization diffusion coefficient is used to diffuse an error caused by a quantization process which is performed using the quantization threshold value to neighboring pixels as taught by Nomura' 728 reference. The motivation for doing so would have to improve the error diffusion process of the image apparatus when image data has multi-density-levels, and further setting fixed threshold values in the error diffusion process provided could easily be established for one another with predictable results.

Regarding claim 3, in accordance with claim 1.

Tajika discloses wherein said first processing unit is an error diffusion process for executing quantization on the basis of information of the other density components among said plurality of density components (**i.e. a process in which data corresponding to the thus generated dots of each density is converted so as to**

have a resolution which corresponds to the dots of each density, col 2, lines 3-12).

Regarding claim 7.

Claim 7 is directed to an image process method claim which substantially corresponds to operation of the device in claim 1 with method steps directly corresponding to the function of device elements in claim 1. Thus, claim 7 is rejected as set forth above for claim 1.

Regarding claim 9, in accordance with claim 7.

Claim 9 is directed to an image process method claim which substantially corresponds to operation of the device in claim 3 with method steps directly corresponding to the function of device elements in claim 3. Thus, claim 9 is rejected as set forth above for claim 3.

Regarding claim 13.

Claim 13 is directed to a computer-readable storage medium claim which substantially corresponds to operation of the device in claim 1 with processing steps directly corresponding to the function of device elements in claim 1. Thus, claim 13 is rejected as set forth above for claim 1.

Regarding claim 15, in accordance with claim 13.

Claim 15 is directed to a computer-readable storage medium claim which substantially corresponds to operation of the device in claim 3 with processing steps directly corresponding to the function of device elements in claim 3. Thus, claim 15 is rejected as set forth above for claim 3.

Regarding claim 28, in accordance with claim 1.

Tajika discloses wherein the plurality of density components correspond to respective different colorants used in image formation (**i.e. density components corresponding to respect colorants, i.e. cyan, and magenta, etc., Fig. 1, col 4, lines 30-59**), and wherein a first one of the colorants corresponding to the first density component and a second one of the colorants corresponding to the second density component have similar colors and wherein the first colorant has a lower density than the second colorant (**i.e. light ink component of cyan verse dark ink component of cyan as described in Fig. 3, col 5, lines 12-34**).

7. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tajika et al (US 5,142,374) in view of Nomura (US 5,708,728) as applied to claim 1 above, and further in view of Fujimori (US 6,328,404)

Regarding claim 29, in accordance with claim 1.

Tajika does not disclose wherein one dot outputted based on the first density component has a smaller size than one dot based on the second density component.

Fujimori teaches wherein one dot outputted based on the first density component has a smaller size than one dot based on the second density component (**i.e. The maximum density dot represents the dot having a maximum quantity of ink or a maximum area; that is, the dot size of light ink has smaller dot size than dark ink because lighter ink has less ink density than the dark ink, col 19, lines 13-34**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Tajika and Nomura to include wherein one dot outputted based on the first density component has a smaller size than one dot based on the second density component taught by Fujimori since doing so would enable the apparatus of Tajika to attains high quality printing by expressing densities in a wide range.

8. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tajika et al (US 5,142,374) in view of Nomura (US 5,708,728) as applied to claim 1 above, and further in view of Hong et al (US 6,614,556)

Regarding claim 30, in accordance with claim 1.

Tajika does not disclose wherein the first processing unit executes a modulation type error diffusion process, and the second processing unit executes a fixed type error diffusion process.

Hong teaches a processing unit executes a modulation type error diffusion process (**Referring to Fig. 1, the circuit of Fig. 1 executes a modulation type error diffusion process, col 4, lines 41-59**); and

Nomura teaches a processing unit executes a fixed type error diffusion process (**Referring to Fig. 5, the Circuit of Fig. 5 executes a fixed type error diffusion process**, **i.e. predetermined threshold values are used for the process, col 6, line 54 to col 7, line 24**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Tajika to include wherein the first processing unit executes a modulation type error diffusion process as taught by Hong, and the second processing unit executes a fixed type error diffusion process as taught by Nomura. The motivation would have been to improve image reproduction quality by minimizing artifacts with modulating threshold in quantization process (col 2, lines 15-34, Hong) and to improve the efficiency of image reproduction process, i.e. ink savings (col 3, line 10-15 and col 4, lines 12-65, Nomura).

9. Claim 25, 26 and 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tajika et al (US 5,142,374) in view of Nomura (US 5,708,728) and Fujimori (US 6,328,404).

Regarding claim 25.

Tajika discloses an image processing apparatus for executing an error diffusion process to a plurality of density components (**i.e. referring to Fig. 1, an image process system performs error diffusion process to color components, i.e. cyan, magenta, yellow and black, col 4, lines 31-59**), comprising: a processor and a memory (**i.e. referring to Fig. 9, an image processing system includes a CPU, or a microprocessor and memory, col 8, lines 18-38**);

a first processing unit (**i.e. referring to Fig. 1, a binary circuit 25**) that executes the error diffusion process (**i.e. a dither process for dark ink**) by changing at least one of a quantization threshold value and a quantization diffusion coefficient which are used

for the error diffusion process on the basis of information on one of the density components to be processed (**i.e. error diffusion process is performed for multi-drop pixels with a plurality of threshold levels corresponding to different gray values, or density values, col 6, lines 18-36**);

a second processing unit (**i.e. referring to Fig. 1, a binary circuit 26**) that executes the error diffusion process (**i.e. a dither processing for light ink**) wherein the error diffusion process by the second processing unit requires a lighter processing load than the error diffusion process by the first processing unit (**i.e. Tajika discloses two different dithering processes, one for dark density ink and the other for light density ink; for dark density ink, error diffusion process is performed with a plurality of threshold values and thus it requires longer time to complete the process, col 6, lines 18-36**); and

an error diffusion processing control unit (**i.e. CPU 90, or the microprocessor**) that controls to execute, by the first processing unit, the error diffusion process to a first density component among the plurality of density components (**i.e. a dither, or error diffusion process is performed for color pixels with a plurality of threshold levels corresponding to different density values, col 6, lines 18-36**), and by the second processing unit (**i.e. referring to Fig. 1, a binary circuit 26**), the error diffusion process to the a second density component among the plurality of density components, wherein the first and second density components have respective different component types and wherein one dot output based on the first density component has a lower density than one dot output based on the second density component (**i.e. Tajika discloses a color**

density discrimination table separating light and dark inks based on ink density, and different dither processes are performed to light/dark ink in accordingly; thus, one dot of output based on the second process of Tajika has lower density of the dot processed in the second Tajika's dither process, Figs. 1-3, col 4, lines 30-59).

Tajika does not disclose by setting, into fixed values, the quantization threshold value and the quantization diffusion coefficient which are used for the error diffusion process; and wherein the first and second density components have respective different component types and wherein one droplet output based on the first density component has a smaller size than one droplet output based on the second density component.

Aoki teaches by setting, into fixed values, the quantization threshold value and the quantization diffusion coefficient which are used for the error diffusion process (**i.e. when the binarization processing is not required to be changed in accordance with the color of data but can be carried out with fixed threshold values, col 13, line 55 to col 14, line 2**); and

Fujimori teaches wherein the first and second density components have respective different component types and wherein one droplet output based on the first density component has a smaller size than one droplet output based on the second density component (**i.e. The maximum density dot represents the dot having a maximum quantity of ink or a maximum size of droplet; that is, the droplet size of light ink has smaller droplet size than dark ink because lighter ink has less ink density than the dark ink, col 19, lines 13-34**).

Having an image processing apparatus of Tajika' 374 reference and then given the well-established teaching of Aoki' 392 reference, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the image processing apparatus of Tajika' 374 reference to include setting, into fixed values, the quantization threshold value and the quantization diffusion coefficient which are used for the error diffusion process as taught by Aoki' 392 reference since doing so would simplify the hardware scale and computer programs of the image apparatus (col 13, lines 68 to col 14, lines 2, Aoki); and then would have to modify the combination of Tajika's to include wherein the first and second density components have respective different component types and wherein one droplet output based on the first density component has a smaller size than one droplet output based on the second density component as taught by Fujimori, since doing so it would enhance the image apparatus of Tajika's to attains high quality printing by expressing densities in a wide range, and further having wide range of densities in the error diffusion process provided could easily be established for one another with predictable results.

Regarding claim 26.

Claim 26 is directed to an image process method claim which substantially corresponds to operation of the device in claim 15 with method steps directly corresponding to the function of device elements in claim 25. Thus, claim26 is rejected as set forth above for claim 25.

Regarding claim 27.

Claim 27 is directed to a computer-readable storage medium claim which substantially corresponds to operation of the device in claim 25 with processing steps directly corresponding to the function of device elements in claim 25. Thus, claim 27 is rejected as set forth above for claim 25.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven Kau whose telephone number is 571-270-1120 and fax number is 571-270-2120. The examiner can normally be reached on M-F, 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Moore can be reached on 571-272-7437. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status /David K Moore/

Supervisory Patent Examiner, Art Unit 2625information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Steven Kau/
Examiner, Art Unit 2625
September 16, 2009

/David K Moore/
Supervisory Patent Examiner, Art Unit 2625